

IN THE CLAIMS

Please amend Claim 1. Please add Claims 2-23. All pending claims and their present status are produced below.

1 1. (Currently Amended) A parallel plate varactor comprising:
2 a bottom electrode;
3 a top electrode;
4 a dielectric layer sandwiched between the bottom electrode and the top electrode,
5 wherein a permittivity of the dielectric layer varies according to an electric
6 field applied to the dielectric layer; the bottom electrode, dielectric layer, and
7 top electrode are integrated on a substrate; and an overlap between the bottom
8 electrode, dielectric layer, and top electrode defines an active region for the
9 varactor; and
10 wherein, for at least one of the electrodes:
11 a resistance of the active region of the electrode is significantly higher than a
12 resistance of a bulk region of the electrode;
13 the active region has ~~a lateral~~ an area A, the electrode has a current conducting
14 perimeter P; and a ratio R of the perimeter P to a square root of the
15 area A is at least 2.0.

1 2. (New) The parallel plate varactor of Claim 1 wherein:
2 the active region comprises at least one cell, each cell having a rectangular shape; and
3 for each cell, the current conducting perimeter of the at least one electrode includes at
4 least three sides of the cell.

1 3. (New) The parallel plate varactor of Claim 1 wherein the dielectric layer comprises a
2 ferroelectric thin film layer.

1 4. (New) The parallel plate varactor of Claim 1 wherein the at least one electrode
2 comprises a refractory metal.

1 5. (New) A parallel plate capacitor comprising:

2 a bottom electrode;

3 a dielectric layer overlying a portion of the bottom electrode;

4 a top electrode overlying a portion of the dielectric layer; and

5 wherein, for at least one of the electrodes:

6 an active region is defined by an overlap between the bottom electrode, the

7 dielectric layer, and the top electrode;

8 a resistivity of the active region of the electrode is higher than a resistivity of a

9 bulk region of the electrode; and

10 the active region has an area A ; the electrode has a current conducting

11 perimeter P ; and a ratio R of the perimeter P to a square root of the

12 area A is at least 2.0.

1 6. (New) The parallel plate capacitor of Claim 5 wherein:

2 the active region comprises at least one cell, each cell having a rectangular shape; and

3 for each cell, the current conducting perimeter of the at least one electrode includes at

4 least three sides of the cell.

1 7. (New) The parallel plate capacitor of Claim 5 wherein the dielectric layer comprises a
2 ferroelectric thin film layer.

1 8. (New) The parallel plate capacitor of Claim 5 wherein the at least one electrode
2 comprises a refractory metal.

1 9. (New) The parallel plate capacitor of Claim 6 wherein:
2 the at least one electrode includes the bottom electrode; and
3 for each cell, the current conducting perimeter of the top electrode includes a fourth
4 side of the cell.

1 10. (New) The parallel plate capacitor of Claim 5 wherein:
2 the bottom electrode comprises platinum;
3 the dielectric layer comprises at least one of the materials selected from a group
4 consisting of: barium titanate, strontium titanate, and barium strontium
5 titanate; and
6 the top electrode comprises gold.

1 11. (New) A parallel plate capacitor comprising:
2 a bottom electrode;
3 a thin film dielectric layer overlying the bottom electrode, wherein the dielectric layer
4 comprises at least one of the materials selected from a group consisting of:
5 barium titanate, strontium titanate and barium strontium titanate; and

6 a top electrode overlying the dielectric layer;
7 wherein:
8 an active region is defined by an overlap between the bottom electrode, the
9 dielectric layer, and the top electrode;
10 the active region comprises exactly one cell; and
11 the active region has an area A; the bottom electrode has a current conducting
12 perimeter P; and a ratio R of the perimeter P to a square root of the
13 area A is at least 2.0.

1 12. (New) The parallel plate capacitor of Claim 11 wherein the bottom electrode
2 comprises a refractory metal.

1 13. (New) The parallel plate capacitor of Claim 12 wherein the refractory metal
2 comprises platinum.

1 14. (New) The parallel plate capacitor of Claim 11 wherein the bottom electrode further
2 comprises:
3 an active portion including the active region, wherein the active portion comprises
4 platinum; and
5 a contact portion contacting the active portion, wherein the contact portion comprises
6 gold.

1 15. (New) The parallel plate capacitor of Claim 11 wherein the ferroelectric thin film
2 dielectric layer comprises barium strontium titanate.

1 16. (New) The parallel plate capacitor of Claim 11 wherein the top electrode comprises
2 gold.

1 17. (New) The parallel plate capacitor of Claim 11 wherein:
2 the active region comprises a polygon with N sides; and
3 the current conducting perimeter comprises N-1 of the sides.

1 18. (New) The parallel plate capacitor of Claim 11 wherein:
2 the active region comprises a rectangle having two long sides and two short sides; and
3 the current conducting perimeter comprises the two long sides and one short side.

1 19. (New) The parallel plate capacitor of Claim 11 wherein:
2 the bottom electrode comprises platinum;
3 the ferroelectric thin film dielectric layer comprises barium strontium titanate;
4 the top electrode comprises gold;
5 the active region comprises a rectangle having two long sides and two short sides; and
6 the current conducting perimeter includes at least three sides of the rectangle.

1 20. (New) A parallel plate capacitor comprising:
2 a bottom electrode;
3 a thin film dielectric layer overlying the bottom electrode, wherein the dielectric layer
4 comprises at least one of the materials selected from a group consisting of:
5 barium titanate, strontium titanate and barium strontium titanate; and

6 a top electrode overlying the dielectric layer;
7 wherein:
8 an active region is defined by an overlap between the bottom electrode, the
9 dielectric layer, and the top electrode;
10 the active region comprises at least two cells; and
11 the active region has an area A; the bottom electrode has a current conducting
12 perimeter P; and a ratio R of the perimeter P to a square root of the
13 area A is at least 2.0.

1 21. (New) The parallel plate capacitor of Claim 20 wherein:
2 each cell comprises a polygon with N sides; and
3 the current conducting perimeter comprises at least N-1 of the sides of each cell.

1 22. (New) The parallel plate capacitor of Claim 20 wherein:
2 each cell comprises a rectangle having two long sides and two short sides; and
3 the current conducting perimeter comprises the two long sides and one short side of
4 each cell.

1 23. (New) The parallel plate capacitor of Claim 20 wherein:
2 the bottom electrode comprises platinum;
3 the ferroelectric thin film dielectric layer comprises barium strontium titanate;
4 the top electrode comprises gold;
5 each cell comprises a rectangle having four sides; and

6 the current conducting perimeter includes at least three sides of the rectangle of each
7 cell.